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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/822,562	04/09/2004	Jerome J. Braun	MIN-P01-001	2610

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EXAMINER	
YU, MELANIE J	

ART UNIT	PAPER NUMBER
1641	

DATE MAILED: 11/29/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/822,562	BRAUN ET AL.	
	Examiner	Art Unit	
	Melanie Yu	1641	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 September 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5,10-16,19-29,35-40 and 47-68* is/are pending in the application.

4a) Of the above claim(s) *1-5,10-16,19-29,35 and 68* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *36-40 and 47-67* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 December 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *9/6*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 6 September 2006 has been entered.

Withdrawn Rejections

Previous rejections under 35 USC 112, second paragraph have been withdrawn.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 36-40 and 47-67 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 36 and 47 are unclear because they recite developing a signature for the pathogenic agent. It is unclear how the signature is developed or what type of signature is formed. It is unclear whether the machine learning develops a signature or whether the signature is formed and detected by an external device and inputted to the machine learning training.

Claim 47 recites "a microarray" in lines 7 and 17 of the claim. It is unclear whether the microarrays are the same or whether different microarrays are used for employing and measuring.

Claim 48 recites "a plurality of biological responses", and it is unclear whether these are the same plurality of biological responses recited in claim 47 or whether separate biological responses are increased.

Claim 52 recites "a pathogen". It is unclear whether the pathogen is the same as that recited in claims 47, 48 and 59 or whether a different pathogen is identified. Claim 54 recites "a microarray", and it is unclear whether the "a microarray" is the same microarray recited in claim 47.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 36-40, 47, 52 and 67 are rejected under 35 U.S.C. 103(a) as being unpatentable over Manger et al. (How the host 'sees' pathogens: global gene expression responses to infection, 2000) in view of Vissing et al. (US 2003/0022200).

Regarding claims 36, 40 and 47, Manger et al. teach collecting biological data representative of a biological response to a pathogenic agent (comparing responses induced by sets of microorganisms that differ, pg. 217, left column, second paragraph, lines 1-5);

providing a set of host cells and contacting the cells with a sample containing the pathogenic agent (human cells exposed to infectious agents, pg. 217, left column, last sentence-right column, first sentence; cells are in a microarray format, pg. 216, left column last paragraph and pg. 216, right column, last paragraph); employing a microarray having a plurality of probes to measure and collect a plurality of biological responses (pg. 215, right column, last paragraph); developing a signature for the pathogenic agent (methods for pattern recognition based on the immune response, pg. 216, *microarray techniques*; pg. 217, Fig. 1 shows signature for infectious agents); and detecting and identifying the pathogenic agent in a sample by exposing host cells to the sample (pathogen recognition is utilized, pg. 218, right column). Manger et al. fail to teach a process of applying machine learning to process automatically substantially all of the biological data and employing information fusion to combine automatically information from the signature.

Vissing et al. teach a method for comprising: collecting biological data representative of a biological response to a specific parameter (par. 14), including: providing a microarray of biomolecules having a plurality of probes to measure and collect a plurality of biological responses (plurality of experimental information is gathered from arrays, par. 23-24); applying the plurality of biological responses to train a machine learning system to recognize the parameters (inputting data into a neural network program, par. 14-16 and par. 43-44); applying machine learning to process automatically substantially all of the biological data and to develop a signature for the parameter (machine learning is applied to analyze initial data and create rules directed toward a variety of properties, par. 43-44); employing information fusion to combine automatically information from the biological data and machine learning processed biological data (data out put is inputted into a neural network program to analyze results, par. 67-68); and detecting and identifying a parameter of a sample by exposing the microarray o a sample and using a microarray to measure

plurality biological responses provoked in the immobilized biomolecules (par. 77-78); and employing the trained machine learning system to identify the parameter (neural network is used to identify biological response in the sample, par. 77-78; par. 80), in order to provide collection of vast amounts of expression data from large numbers of samples and efficiently mine the data to find items of particular relevance. Although Vissing et al. do not specifically use the term "information fusion", information fusion is defined as "the exploitation of all or substantially all available information" in the instant specification, which encompasses the information analysis process taught by Vissing et al. because Vissing et al. teach processing results from microarrays to determine the parameters of a sample.

Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to include in the method of Manger et al., the method of analyzing the sample data including applying machine learning and employing information fusion to automatically combine information and employ trained machine learning system to identify a parameter as taught by Vissing et al., in order to provide increased accuracy due to initial and new design rules.

With respect to claim 37, Vissing et al. teach collecting multiple modalities of biological data (plurality of input nodes on the neural network for different outputs from the microarray indicate that multiple modalities of biological data are collected, par. 72).

Regarding claims 38 and 39, Vissing et al. teach the biological data including substantially all of the data collected by common probes among a microarray having at least one set of probes (a mixture of biomolecules immobilized at a defined position to form an array, par. 60). Manger et al. teach collecting multiple modalities of biological data representative of a biological response to a pathogenic agent (diagnostic signatures are collected for different genes with the same pathogen, pg. 217, left column, second paragraph). Manger et al. teach collecting data including employing at least one microarray

each having at least one set of probes (DNA microarrays are used to view the transcription events that underlie the host response to pathogens (pg. 215, right column, second paragraph, lines 1-3; microarrays are used to examine responses from a large number of genes, pg. 216, left column, second paragraph). Manger et al. also teach the biological response including the biological response of a host cell (response from human cells exposed to infectious agents, which are pathogens, pg. 217, left column, second paragraph, last 2 lines-right column, first paragraph, host cell, pg. 215, third paragraph, lines 6-10).

Regarding claim 52, Vissing et al. teach allowing the recognizer to generate plurality decision results (plurality of results, par. 24); and fusing the plural decision results to generate a determination of the identification of the parameter in the test sample (transformation of plurality of results indicates the results are fused in a normalization, aggregation or scaling process, par. 24), wherein when used in the method of Manger et al. the pathogen in a test sample is identified (pathogen recognition is utilized, pg. 218, right column).

With respect to claim 67, Manger et al. teach the pathogenic agent being uncataloged (pathogenic agent is unknown prior to identification, pg. 217, left column last paragraph-right column).

4. Claims 36, 39, 40, 47-51, 53-55 and 58-59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhu et al. (US 2004/0014027) in view of Vissing et al. (US 2003/0022200) further in view of.

Regarding claims 36, 40 and 47, Zhu et al. teach a method for identifying the presence of a pathogenic agent comprising: collecting biological data representative of a biological response to the same pathogenic agent (different sets of arrays creates a control and disparate types of data are collected from the arrays, par. 0138); providing a set of host cells and contacting the cells with the pathogenic agent (array of probes, par. 70, and

host cells are probes, par. 125, and host cells are contacted with the pathogenic agent, par. 125); employing a microarray having a plurality of probes to measure and collected a plurality of biological responses of the host cell (array of probes, par. 70, host cells are probes and responses of the cell in response to a pathogenic agent is gathered, par. 125); and detecting and identifying the pathogenic agent in a sample by exposing host cells to the sample and using a microarray to measure plurality biological responses provoked in host cells (expression levels of genes that are induced or repressed by HCMV are identified to provide identification of HCMV, par. 36; pathogen signature is measured, par. 135). Zhu et al. fail to teach the analysis and detection steps of applying the biological responses to train a machine learning system to recognize the pathogenic agent, applying machine learning to process automatically substantially all of the biological data and to develop a signature for the pathogenic agent and employing information fusion to combine automatically information from the signature.

Vissing et al. teach a method for comprising: collecting biological data representative of a biological response to a specific parameter (par. 14), including: providing a microarray of biomolecules having a plurality of probes to measure and collect a plurality of biological responses (plurality of experimental information is gathered from arrays, par. 23-24); applying the plurality of biological responses to train a machine learning system to recognize the parameters (inputting data into a neural network program, par. 14-16 and par. 43-44); applying machine learning to process automatically substantially all of the biological data and to develop a signature for the parameter (machine learning is applied to analyze initial data and create rules directed toward a variety of properties, par. 43-44); employing information fusion to combine automatically information from the biological data and machine learning processed biological data (data out put is inputted into a neural network program to analyze results, par. 67-68); and detecting and identifying a parameter

of a sample by exposing the microarray o a sample and using a microarray to measure plurality biological responses provoked in the immobilized biomolecules (par. 77-78); and employing the trained machine learning system to identify the parameter (neural network is used to identify biological response in the sample, par. 77-78), in order to provide collection of vast amounts of expression data from large numbers of samples and efficiently mine the data to find items of particular relevance. Although Vissing et al. do not specifically use the term "information fusion", information fusion is defined as "the exploitation of all or substantially all available information" in the instant specification, which encompasses the information analysis process taught by Vissing et al. because Vissing et al. teach processing results from microarrays to determine the parameters of a sample.

Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to include in the method of Zhu et al., the method of analyzing the sample data including applying machine learning and employing information fusion to automatically combine information and employ trained machine learning system to identify a parameter as taught by Vissing et al., in order to provide increased accuracy due to initial and new design rules.

With respect to claims 39 and 48-49, Zhu et al. teach employing the set of host cells and a plurality of microarrays to increase a plurality of biological responses (four microarrays employed, par. 0135). Zhu et al. further teach providing a plurality of sets of host cells (repeated multiple times, which means multiple sets of were used, par. 0130, 0136), contacting the host cells with a sample containing pathogenic agents to provoke and measure a plurality of biological responses (pathogens are contacted with plurality of host cells, therefore plurality of responses are generated, par. 0136), Vissing et al. teach training a recognizer to detect one or more of the signatures in a biological response provoked in a

sample (par. 16-18), and applying machine learning to at least one pathogenic signature (par. 24-26).

With respect to claims 50 and 51, Zhu et al. teach employing substantially all of the measured biological response data during the identification method to widen the scope of information employed during pathogen detection and including identifying a pathogen signature having substantially all of the measured biological data (par. 0135).

Regarding claim 53, Zhu et al. teach using the host cells as a natural amplification mechanism, thereby allowing improved detection and identification of pathogenic agents (par. 0038 and 00136).

With respect to claims 54 and 55, Zhu et al. teach employing a microarray wherein the modality is genomic (par. 0080). Although the claim recites employing microarrays of different modalities, the claim recites employing a single microarray and not a plurality of microarrays. Therefore, the claim is interpreted as employing a single microarray with a single modality.

Regarding claims 58 and 59, Zhu et al. teach gathering information from multiple microarray types (control and test microarrays, par. 0114) and gathering multiple candidate identification responses generated by multiple classifiers (control and test samples for mock-HCMV and HMCV, par. 0114, 0136, 0138), which would be information that is fused when inputted into the analysis method of Vissing et al.

5. Claims 56 and 57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhu et al. (US 2004/00140127) in view of Vissing et al. (US 2003/0022200) further in view of Glezer et al. (US 2004/0189311).

Zhu et al. in view of Vissing et al., as applied to claim 53, teach a method for identifying the presence of a pathogenic agent of a virus, but fail to teach the pathogenic agent being a toxin.

Glezer et al. teach using arrays for detection of a pathogenic agent being a toxin or virus (par. 0296), in order to provide panels for an immunoassay.

Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to include in the method of Zhu et al. in view of Vissing et al., employing a microarray fro detection of a toxin as taught by Glezer et al., in order to detect potential bioterrorism agents.

6. Claims 52 and 60-66 rejected under 35 U.S.C. 103(a) as being unpatentable over Zhu et al. (US 2004/0014027) in view of Vissing et al. (US 2003/0022200) further in view of Braun (Sensor Data Fusion with Support Vector Machine Techniques, 2002, Sensor Fusion: Architectures, Algorithms, and Applications VI, pages 98-109) and Brown et al. (Knowledge-based analysis of microarray gene expression data by using support vector machines, 2000, PNAS, pages 262-267).

Zhu et al. in view of Vissing et al., as applied to claim 47, teach a method of collecting disparate types of biological data representative of a biological response, but fail to teach partitioning an input space of microarray probes.

Braun teaches using a support vector technique to partition an input space into one or more computation subspaces (pg. 101, second paragraph) and generate measures of fitness for the subspaces (computing the incompleteness for the subspaces, pg. 104, second paragraph), in order to provide data incompleteness correction, but fail to teach the input space being a microarray.

Brown et al. teach using a microarray of probes (pg. 262, right column, last paragraph) and using a support vector technique (pg. 263, left column, fourth paragraph), in order specify which data should cluster together.

Therefore it would have been obvious to include in the method of Zhu et al. in view of Vissing et al., a support vector technique to partition an input space and generate

measures of fitness as taught by Braun, in order to provide superior gene recognition for microarrays by producing less false positive and false negative results as taught by Brown et al.

With respect to claim 52, Braun teaches allowing a recognizer to generate plural decision results (pg. 99, second paragraph), and fusing the plural decision results to generate a determination of recognition of events (pg. 99, second paragraph-third paragraph). The recognition events are the determination of pathogens in a sample in Zhu et al. and therefore the identity of a pathogen of Zhu et al. when the method of Braun is applied.

Regarding claims 61-63, Braun teaches generating multiple measures of fitness within a subspace wherein intra-subspace measures of fitness are dynamic having a value depending on the region within the subspace and position within the subspace of a point representing the test sample (dynamic incompleteness calculations are calculated, pg. 104, second paragraph). Braun also teaches determining for a subspace a fitness measure representative of effectiveness of a classifier operating in the respective subspace (constructing a classifier, pg. 100, last paragraph) and partitioning an input into a plurality of subspaces (original space divided into higher-dimensional space, pg. 101, second paragraph).

With respect to claims 64-66, Braun teaches fusing measures of recognition generated from respective areas of the subspaces (pg. 104, fifth paragraph) and using subspace measures of fitness and fusing multiple classifiers (pg. 105, last paragraph-pg. 106, first paragraph). Braun teaches applying Dempster-Shafer theory of evidence for fusing multiple classifiers (pg. 99, last paragraph).

Response to Arguments

7. Applicant's arguments with respect to claims 36-40 and 47-67 have been considered but are moot in view of the new ground(s) of rejection. The previous rejections of the claims has been withdrawn. Upon further consideration, a new ground(s) of rejection is made in view of applicant's amendment requiring applying machine learning to develop a signature for a pathogenic agent and applying information fusion to utilize the signature data.

Conclusion

No claims are allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Melanie Yu whose telephone number is (571) 272-2933. The examiner can normally be reached on M-F 8:30-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Long Le can be reached on (571) 272-0823. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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